Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): Device for detecting an environmental influence (15) onto a sensor (5), by means of detecting a change in an electrical conductivity of a sensor layer (3) of the sensor (5), ~~whereby~~ wherein the sensor (5) has a first (7) and a second (9) excitation electrode, a piezoelectric material (11), and a sensor layer (3), which comprises: an excitation unit for generating electrical potentials (13), which are passed to the piezoelectric material by way of the first (7) and the second (9) excitation electrode, whereby the sensor layer (3) ~~rests~~ lies against both at least one excitation electrode and the piezoelectric material, at least in ~~certain regions~~ sections, and the sensor layer (3) has a conductivity that is dependent on environmental influences, so that the piezoelectric material can be excited to vibrate by means of the excitation electrodes and the sensor layer (3), wherein a frequency measurement device (17) makes it possible to detect a vibration order of the piezoelectric material.

Claim 2 (Previously Presented): Device according to claim 1, wherein the excitation unit (13) is formed by means of an oscillation circuit or a network analyzer.

Claim 3 (Previously Presented): Device according to claim 1, wherein the excitation electrode is formed from a metal, a non-oxide ceramic, oxide ceramic, or a precious metal.

Claim 4 (Previously Presented): Device according to claim 1, wherein the excitation electrode lies directly against the piezoelectric material.

Claim 5 (Previously Presented): Device according to claim 1, wherein the first excitation electrode (7) lies against the piezoelectric material with an area that is as large as an area with which the second excitation electrode (9) lies against the piezoelectric material.

Claim 6 (Previously Presented): Device according to claim 1, wherein the first excitation electrode (7) lies against the piezoelectric material with an area that is larger than or smaller than an area with which the second excitation electrode (9) lies against the piezoelectric material.

Claim 7 (Previously Presented): Device according to claim 1, wherein the excitation electrode(s) lie against the piezoelectric material with a circular area.

Claim 8 (Previously Presented): Device according to claim 1, wherein the first excitation electrode (7) has a same geometry as the second excitation electrode (9).

Claim 9 (Previously Presented): Device according to claim 1, wherein the piezoelectric material is formed from a quartz, from langasite, its isomorphous compounds, or from gallium orthophosphate, or is a piezoelectric material that is capable of functioning even at temperatures up to 1000°C.

Claim 10 (Previously Presented): Device according to claim 1, wherein the piezoelectric material has the basic shape of a cylinder.

Claim 11 (Previously Presented): Device according to claim 1, wherein the sensor layer (3) lies directly against the at least one excitation electrode and/or the piezoelectric material.

Claim 12 (Previously Presented): Device according to claim

1, wherein the sensor layer (3) is configured in circular shape.

Claim 13 (Previously Presented): Device according to claim 1, wherein the sensor layer (3) contains oxide ceramics, non-oxide ceramics, semiconductors, organic synthetic or natural polymers, ZnO, ZnS, TiO2, Se, CeO2, oxides of transition metals, proteins or nucleic acids.

Claim 14 (Previously Presented): Device according to claim 1, herein the frequency measurement device (17) comprises a frequency counter.

Claim 15 (Previously Presented): Device according to claim 1, wherein the vibration order is the first, third, fifth, or higher.

Claim 16 (Previously Presented): Method for detecting an environmental influence (15) on a sensor by means of detecting a change in the electrical conductivity of a sensor layer (3) of the sensor, using a device according to claim 1, which comprises the following steps:

1. Generating a fundamental tone in a piezoelectric material,

2. Measuring the resonance frequency of the vibration order of step 1,

3. Exerting an environmental influence (15) on the sensor layer (3), causing the conductivity of the sensor layer (3) to be changed and thereby causing the frequency spectrum of the piezoelectric material to be changed,

4. Measuring the vibration order after exertion of the environmental influence,

5. Calculating a resonance frequency difference that is formed from the difference of the resonance frequency of the vibration order of step 1 and the resonance frequency of the vibration order after changing the environmental influence, and

6. Correlating the extent of the environmental influence (15) with the resonance frequency difference.

Claim 17 (Previously Presented): Method according to claim 16, wherein upper harmonics are also generated and measured in the piezoelectric material, which are also taken into consideration in detecting the type or the extent of the environmental influence (15).

Claim 18 (Previously Presented): Method according to claim 16, wherein the resonance frequencies of the upper harmonics serve for a temperature compensation of the vibration behavior of the piezoelectric material.

Claim 19 (Previously Presented): Method according to claim 16, wherein exerting an environmental influence (15) comprises irradiation of the sensor layer (3) with high-energy radiation.

Claim 20 (Previously Presented): Method according to claim 16, wherein the environmental influence (15) is the effect of a chemical or biological substance on the sensor layer (3), or a temperature change.

Claim 21 (Previously Presented): Method according to claim 16, wherein signals that run periodically, particularly rectangular, sine, or triangular signals, are passed to the piezoelectric material by the excitation unit (13).

Claim 22 (Currently Amended): Arrangement (23) of a first sensor (5o) and a second sensor (5u) for detecting an environmental influence (15), whereby the first sensor (5o) has a

first (7) and an opposite second (9) excitation electrode, a piezoelectric material (11) disposed between these, and a sensor layer (3) that covers the first excitation electrode (7) and also the piezoelectric material (11) at least in ~~certain regions~~ sections, and the sensor layer (3) has a conductivity that is dependent on environmental influences (15), so that the piezoelectric material (11) can be excited to vibrate by means of electrical potentials from the excitation unit for generating electrical potentials (13), both by way of the excitation electrodes (7, 9) and by the sensor layer (3), and the resonance frequency of a vibration order of the piezoelectric material (11) can be detected by means of a frequency measurement device (17), and ~~the second sensor (5u) has a first (7) and an opposite second (9) excitation electrode, a piezoelectric material (11) disposed between these, and a sensor layer (3) that covers the excitation electrode (9) at least in certain regions, but does not exceed it, and the sensor layer (3) has a conductivity that is dependent on environmental influences (15), whereby the sensor layer (3) is disposed in such a manner that the piezoelectric material (11) can be excited to vibrate exclusively by means of the excitation electrodes (7, 9), and the resonance frequency of a vibration order of the piezoelectric material can be detected by means of a frequency measurement device (17).~~

the second sensor (5u) has a first (7) and an opposite second (9) excitation electrode, a piezoelectric material (11) disposed between these, and a sensor layer (3) that covers the excitation electrode (9) at least in sections, but does not exceed it, and the sensor layer (3) has a conductivity that is dependent on environmental influences (15), wherein the sensor layer (3) is disposed in such a manner that the piezoelectric material (11) can be excited to vibrate exclusively by means of the excitation electrodes (7, 9), and the resonance frequency of a vibration order of the piezoelectric material can be detected by means of a frequency measurement device (17).

Claim 23 (Previously Presented): Arrangement according to claim 22, wherein the piezoelectric material (11) in the first sensor (5o) is identical with that of the second sensor (5u).

Claim 24 (Previously Presented): Arrangement according to claim 22, wherein the materials of which the excitation electrodes of the first and second sensor (5o, 5u) consist are identical.

Claim 25 (Previously Presented): Arrangement according to claim 22, wherein the material of which the sensor layer (3) of

the first sensor (5o) is formed is identical with the second material of which the sensor layer (3) of the second sensor (5u) is formed.

Claim 26 (Previously Presented): Arrangement according to claim 22, wherein the geometry in which the sensor layer (3) of the first sensor (5o) is shaped is identical with the geometry in which the sensor layer (3) of the second sensor (5u) is shaped.

Claim 27 (Currently Amended): Sensor device (25) for detecting an environmental influence (15), having a first (7) and a second (9) excitation electrode, a piezoelectric material (11) disposed between these, and a sensor layer (3), ~~whereby~~ wherein the first excitation electrode (7) is disposed on a first side of the piezoelectric material (11), and the second excitation electrode (9) is disposed on the opposite, second side of the piezoelectric material, and the sensor layer (3) lies against the first excitation electrode (7) with a first partial area A1, and against the piezoelectric material (11) with a second partial area A2, and the sensor layer (3) has a conductivity that is dependent on environmental influences, so that the piezoelectric material (11) can be excited to vibrate by means of electrical potentials from an excitation unit for generating electrical

potentials (13), both by way of the excitation electrodes (7, 9) and by the sensor layer (3), and the resonance frequency of a vibration order of the piezoelectric material (11) can be detected by means of a frequency measurement device (17), and a third excitation electrode (27) is disposed on the second side of the piezoelectric material, which lies against the piezoelectric material (11) with an area A3, which is at least as large as the partial area A2 of the sensor layer (3) and, if this partial area A2 is projected onto the area A3, the partial area A2 is completely covered by the area A3, and the first, second, and third excitation electrode are electrically connected with a switching means (29) that connects the second (9) and third (27) excitation electrode in electrically conductive manner in a first switching position, so that the conductivity of the sensor layer (3) can be detected, and the switching means (29) connects the first and third excitation electrode (27) in electrically conductive manner in a second switching position, so that the change in the vibration properties caused by deposit of substance of the environmental influence can be measured.

Claim 28 (Previously Presented): Sensor device according to claim 27, wherein the first excitation electrode (7) is formed in the shape of a circular disk on one side of the piezoelectric

material.

Claim 29 (Previously Presented): Sensor device according to claim 27, wherein the second excitation electrode (9) is formed in the shape of a circular disk, and the third excitation electrode (27) is formed in the shape of a circular ring (31).

Claim 30 (Previously Presented): Sensor device according to claim 27, wherein the sensor layer (3) lies directly against the first excitation electrode and is circular.

Claim 31 (Previously Presented): Sensor device according to claim 27, wherein the piezoelectric material is formed in the shape of a cylinder (19), whereby the first, second, and third excitation electrode (27) as well as the piezoelectric material and the piezoelectric material have a common axis of symmetry.